MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

ECT1016 – CIRCUIT THEORY

(All sections / Groups)

17 OCTOBER 2015
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of five pages including cover page with four questions only.

2. Attempt all **FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer Booklet provided. Show all relevant steps to obtain maximum marks.

Question 1

(a) For the circuit shown in Figure Q1(a), determine:

(i) the equivalent resistance [12 marks]

(ii) the current, I [2 marks]

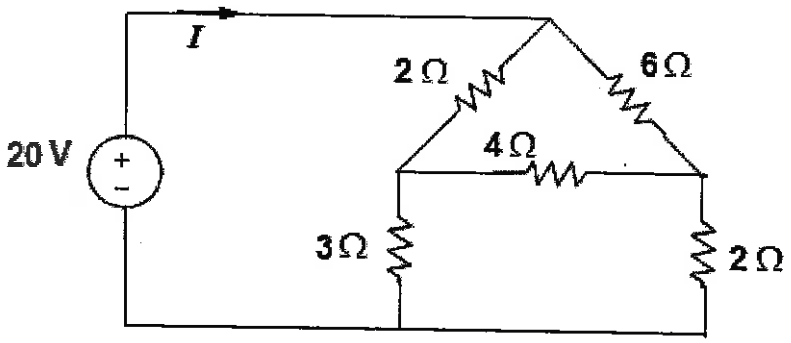

Figure Q1(a)

(b) Consider the circuit in Figure Q1(b). Calculate the current, I by using Norton equivalent circuit. [11 marks]

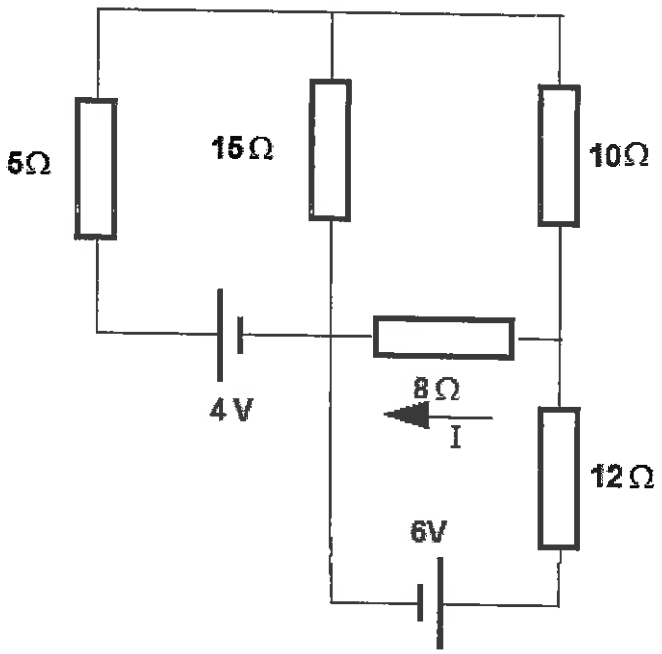

Figure Q1(b)

Continued...

Question 2

(a) For the circuit as shown in Figure Q2(a), determine:

(i) nodal voltages V_a and V_b using Nodal analysis, [11 marks]

(ii) Current (I) through the 3Ω resistor. [2 marks]

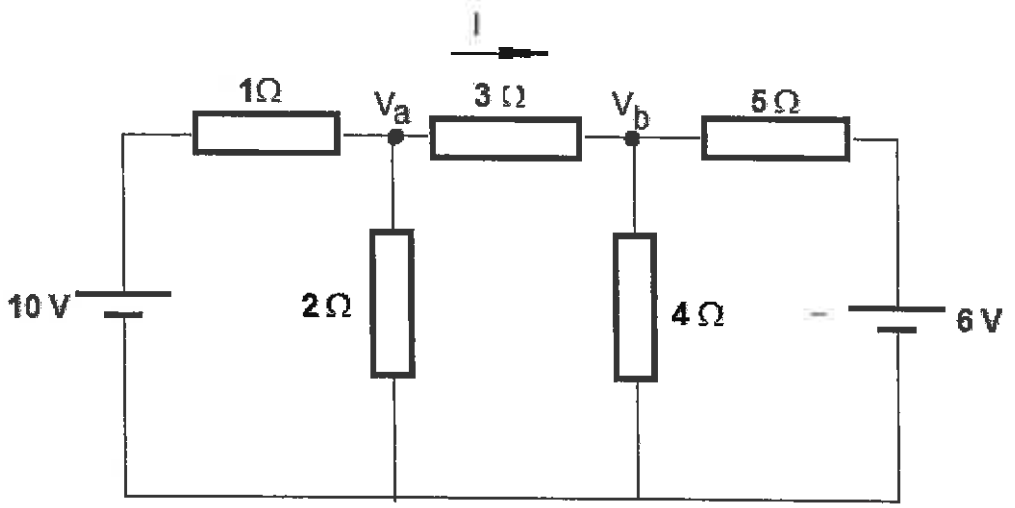

Figure Q2(a)

(b) A current i(t) = 10 + 8 sin(314t) flows through a 20Ω resistor. Find

(i) the frequency and period of the sinusoidal component, and [4 marks]

(ii) the rms value of the dc component, the rms value of the sinusoidal component and the rms value of the total current. [8 marks]

Continued...

Question 3

(a) Figure Q3(a) shows a series RLC circuit with source voltage, $v_s = 50 \angle -30°)V$, and the source current, $i_s = 100 \angle -10° mA$.

Determine:

(i) the total impedance of the circuit, [5 marks]

(ii) the resistance, [1 mark]

(iii) the operating angular frequency, [3 marks]

(iv) the Q-factor, and [3 marks]

(v) the individual voltage drops across the resistor, the inductor and the capacitor. [6 marks]

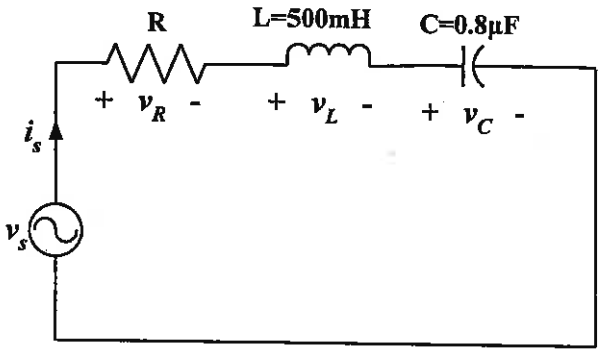

Figure Q3(a)

(b) For the parallel *RL* circuit with a frequency of 2 *kHz* shown in Figure Q3(b) below,

(i) find the total impedance [4 marks]

(ii) draw the resultant phasor diagram for currents [3 marks]

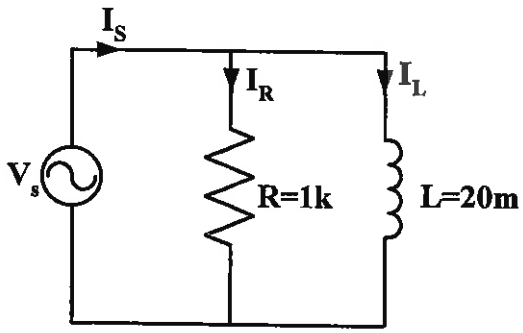

Figure Q3(b)

Continued...

Question 4

(a) Figure Q4(a) shows a coil having a resistance of 20Ω in series with an inductor of $2H$ connected across a battery of $30V$. The switch is closed t = 0

(i) Express the equation of the current flow in the circuit. [5 marks]

(ii) Sketch the graph of the current flow in the circuit. [2 marks]

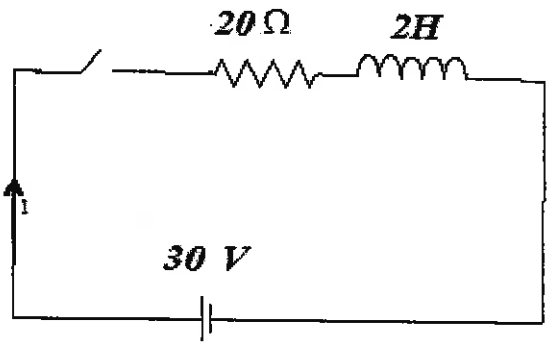

Figure Q4(a)

(b) Determine $i(t)$ for $t > 0$ for the circuit given in Figure Q4(b). Assume that the circuit is in steady state before the switch is opened at $t = 0$.

[18 marks]

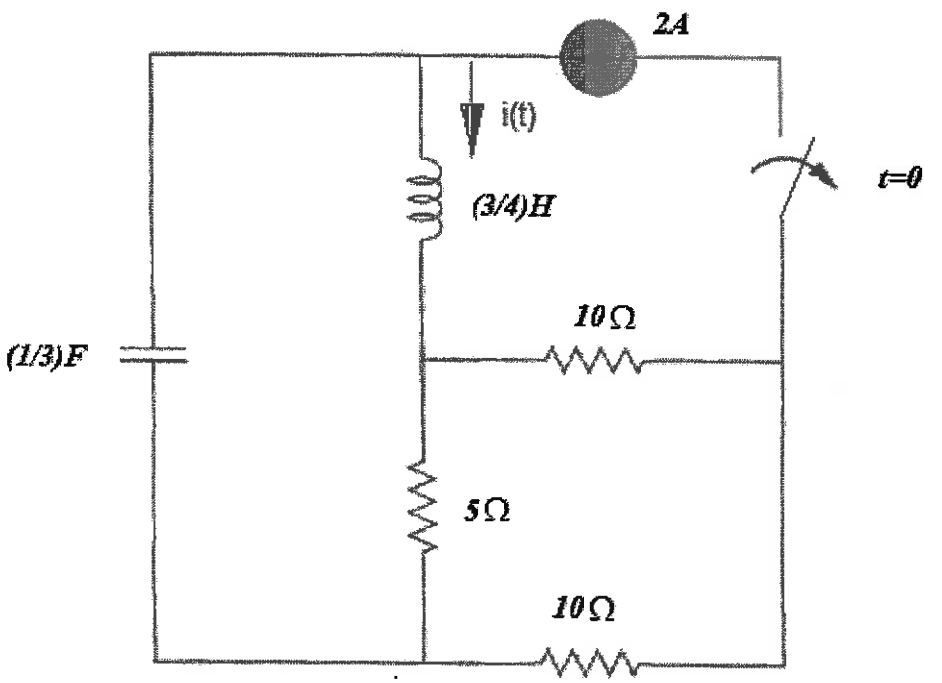

Figure Q4(c)

End of Paper